

REMARKS

In response to the Office Action mailed February 20, 2008, Applicant respectfully requests reconsideration. Claims 1-21, 23-39 and 41-45 were previously pending in this application. Claims 42 and 43 have been amended herein to correct their dependency. No claims have been added or canceled herein. As a result, claims 1-21, 23-39 and 41-45 remain pending for examination with claims 1, 8, 13, 25, 26, and 27 being independent. No new matter has been added.

Objections to the Claims

The Office Action objected to claims 42 and 43 because they depended on canceled claim 40. In response, claims 42 and 43 have been amended to depend from independent claim 27. Accordingly, withdrawal of these objections is respectfully requested.

Rejections Under 35 U.S.C. §102

The Office Action rejected independent claims 1 and 26 under 35 U.S.C. §102(b) as purportedly being anticipated by Shinoda (4,779,036). Applicant respectfully traverses these rejections.

1. Shinoda does not teach or suggest that an accumulated effect on the SCR-type switch of applying the several periods in succession is to start the SCR-type switch.

The Office Action relies on Shinoda as purportedly describing “applying to a switch gate of the SCR-type switch several periods of an unrectified high frequency voltage in succession, such that an accumulated effect on the SCR-type switch of applying the several periods in succession is to start the SCR-type switch.” Applicant respectfully disagrees. Shinoda makes no mention of an accumulated effect created by applying several periods in succession, much less that an accumulated effect starts the switch. Contrary to the Office Action’s rationale, Shinoda’s switch does not turn on in response to an accumulated effect. Rather, Shinoda states that a single pulse turns on Shinoda’s switch. (Col. 5, lines 53-56). Shinoda only applies several pulses in case one

pulse fails to turn the switch on, due to poor environmental conditions. (Col. 5, lines 64-66). Thus, Shinoda's pulses are redundant and produce no accumulated effect.

The Office Action states that the "accumulated effect" recited in claims 1 and 26 is an inherent characteristic of Shinoda's switch because an SCR-type switch inherently comprises parasitic capacitances. Applicant respectfully disagrees with the Office Action's rationale because claims 1 and 26 do not recite "parasitic capacitances." Rather, claim 1, for example, recites "an accumulated effect on the SCR-type switch of applying the several periods in succession is to start the SCR-type switch." The Office Action has provided no rationale as to how the presence of parasitic capacitances implies the creation of an accumulated effect by applying the several periods in succession. Thus, the Office Action fails to meet the standard for inherency. These rejections are further improper because Shinoda makes no mention that an accumulated effect causes the SCR-type switch to start. Notably, the Office Action has provided no rationale as to how Shinoda's device starts due to an accumulated effect, as opposed to being turned on in some other way. Contrary to the Office Action's rationale, a single pulse turns on Shinoda's device, not a combination of pulses. Shinoda makes no mention of one pulse contributing to the effectiveness of another pulse. Instead, one of Shinoda's pulses is effective as long as poor environmental conditions are not present. (Col. 5, lines 64-66).

In addition to being legally insufficient, the Office Action's rationale is incorrect from a technical perspective because the mere presence of parasitic capacitances does not imply the creation of an accumulated effect in Shinoda's switch, much less an accumulated effect that turns on the switch. Shinoda is silent as to the size of any such parasitic capacitances, and makes no mention that such an accumulated effect would be created as a result of Shinoda's pulse timing. One of ordinary skill in the art would appreciate that such an accumulated effect is not inherently present in Shinoda's device.

Applicant's specification provides further evidence that such an accumulated effect is not necessarily present as a result of applied pulses and parasitic capacitances in a switch. The specification states:

A priori, when an A.C. signal is applied to the gate of a thyristor such that the power of each halfwave is insufficient to turn on the thyristor and that the duration of each halfwave is shorter than the component priming time, the effect

of positive and negative halfwaves annuls and the A.C. signal has no switch starting effect. (Page 3, line 31 – Page 4, line 3)

Thus, as described in Applicant's specification, there are some situations in which applying several halfwaves of insufficient power does not turn on the switch. For example, when the duration of each halfwave is shorter than the component priming time, the effect of positive and negative halfwaves cancels out and the switch does not turn on. Thus, an accumulated effect is not necessarily generated, much less an accumulated effect that can turn on the switch.

For these reasons, Shinoda does not teach or suggest that "an accumulated effect on the SCR-type switch of applying the several periods in succession is to start the SCR-type switch," either expressly or inherently.

2. Shinoda fails to teach or suggest that a power of each halfwave of the several periods is individually insufficient to start the SCR-type switch.

The Office Action relies upon Shinoda's pulses as purportedly being such that "the power of each halfwave of the several periods is individually insufficient to start the switch." Applicants respectfully disagree. As explained by Shinoda, each halfwave of Shinoda's pulses is sufficient to turn on the switch. (Col. 5, line 53 – Col. 6, line 2). The fact that Shinoda applies several redundant pulses of sufficient power fails to meet the claim limitations. Notably, Shinoda does not describe a single halfwave having insufficient power to turn on the switch, much less that the power of each halfwave is individually insufficient. Indeed, in Shinoda's device no accumulated effect is necessary because any one of Shinoda's pulses can turn on the switch by itself.

Claim 1

By contrast, claim 1 recites, *inter alia*, applying to a switch gate of the SCR-type switch several periods of an unrectified high frequency voltage in succession, such that an accumulated effect on the SCR-type switch of applying the several periods in succession is to start the SCR-type switch, a power of each halfwave of the several periods being individually insufficient to start the SCR-type switch. As should be appreciated from the above discussion, Shinoda does not teach or suggest that an

accumulated effect on the SCR-type switch of applying the several periods in succession is to start the SCR-type switch. In addition, Shinoda does not teach or suggest that a power of each halfwave of the several periods is individually insufficient to start the SCR-type switch. In view of the foregoing, claim 1 patentably distinguishes over Shinoda. Accordingly, withdrawal of these rejections is respectfully requested.

Claims 2-7 depend from claim 1 and are therefore patentable for at least the same reasons.

Claim 26

Claim 26 recites, *inter alia*, that an SCR-type switch is turned on in response to an accumulated effect of a plurality of halfwaves of the high-frequency control voltage but is not turned on in response to an effect of an individual one of the plurality of halfwaves. As should be appreciated from the above discussion, Shinoda does not teach or suggest that an SCR-type switch is turned on in response to an accumulated effect of a plurality of halfwaves. In view of the foregoing, claim 26 patentably distinguishes over Shinoda. Accordingly, withdrawal of these rejections is respectfully requested.

Rejections Under 35 U.S.C. §103

The Office Action rejected independent claims 8 and 13 under 35 U.S.C. §103(a) as purportedly being unpatentable over Shinoda in view of Iwamuro et al. (6,091,087). The Office Action also rejected independent claim 25 under 35 U.S.C. §103(a) as purportedly being unpatentable over Shinoda in view of Nuckolls (3,344,310). In addition, the Office Action rejected independent claim 27 under 35 U.S.C. §103(a) as purportedly being unpatentable over Shinoda in view of Bhagat (4,630,092). Applicant respectfully traverses these rejections.

Claim 8

Claim 8 recites, *inter alia*, an SCR-type component that is configured such that an accumulated effect of applying the several periods in succession causes the SCR-type switch to turn on. As should be appreciated from the above discussion, Shinoda does not teach or suggest an SCR-type component that is configured such that an accumulated

effect of applying the several periods in succession causes the SCR-type switch to turn on. Iwamuro fails to remedy this deficiency of Shinoda. Therefore, claim 8 patentably distinguishes over any combination of Shinoda and Iwamuro. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 9-12 depend from claim 8 and are therefore patentable for at least the same reasons.

Claim 13

Claim 13 recites, *inter alia*, that the SCR-type switch is turned on in response to an accumulated effect of the plurality of halfwaves, an individual one of the plurality of halfwaves being of insufficient intensity and/or duration to start the switch by itself. As should be appreciated from the above discussion, Shinoda does not teach or suggest that an SCR-type switch is turned on in response to an accumulated effect of a plurality of halfwaves. Iwamuro fails to remedy this deficiency of Shinoda. Therefore, claim 13 patentably distinguishes over any combination of Shinoda and Iwamuro. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 14-21, 23 and 24 depend from claim 13 and are therefore patentable for at least the same reasons.

Claim 25

Claim 25 recites, *inter alia*, providing a high frequency control signal to a gate of the SCR-type switch that controls the SCR-type switch, the high frequency control signal having a frequency of 1 MHz or higher, wherein a duration of a single halfwave of the high frequency control signal is insufficient for the single halfwave to turn on the SCR-type switch. The Office Action concedes (page 9) that the combination of Shinoda and Nuckolls fails to teach or suggest providing a high frequency control signal having a frequency of 1 MHz or higher. However, the Office action contends that it would have been obvious to use a control signal having a frequency of 1 MHz or higher because, where the general conditions of a claim are disclosed in the prior art, discovering optimum or workable ranges involves only routine skill the art. Applicant respectfully disagrees.

The frequency 1 MHz is not the same “general condition” as Shinoda’s frequency of 20 kHz because 1 MHz is fifty times greater than 20 kHz. One of ordinary skill in the art would not have increased Shinoda’s operating frequency by a factor of fifty solely based on a desire to perform routine optimization. It is unclear whether Shinoda’s drive circuitry even would have been capable of supplying pulses at a frequency of 1 MHz. The present case is quite unlike In Re Aller (cited by the Office Action, decided in 1955) in which a claimed temperature range of 40°C - 80°C did not patentably distinguish over a prior art temperature of 100°C. In Aller, the claimed range and prior art differed by a factor of only 1.25, however, in the present case the claimed frequency range differs from the prior art frequency by a factor of fifty. In view of the foregoing, the claimed frequency of greater than 1 MHz is not an obvious variation in view of the prior art.

Even if this rejection were proper (which it is not), MPEP 2144.05 states that the Applicant can rebut a *prima facie* case of obviousness by showing new and unexpected results with respect to the prior art. In fact, the present specification describes how the claimed invention provided a new and unexpected result. The specification states:

A priori, when an A.C. signal is applied to the gate of a thyristor such that the power of each halfwave is insufficient to turn on the thyristor and that the duration of each halfwave is shorter than the component priming time, the effect of positive and negative halfwaves annuls and the A.C. signal has no switch starting effect.

The applicant has however tried the experiment in a diagram of the type in Fig. 1, in which an HF signal is applied between gate G and cathode A of a thyristor. A D.C voltage VAK of appropriate biasing is applied across the series assembly of a load L and of thyristor TH. It is considered that cathode K of the thyristor is grounded.

In Fig. 2, an HF voltage at a frequency of approximately 1 megahertz applied between the gate and the cathode has been shown by a curve 10 and the observed anode current has been shown by a curve 11. It should be noted that, after approximately three halfwaves of the high-frequency A.C. voltage, the thyristor conduction settles. Then, as conventional with a thyristor, the HF power supply can be interrupted and the thyristor remains conductive. (Page 3, line 31 – Page 4, line 13).

[...]

Thus, unexpectedly, when a high-frequency control voltage is applied to the gate of a thyristor, and more generally of an SCR-type switch, said switch is switched on while each halfwave of the A.C. voltage has a power and/or a duration insufficient to ensure the switching of the

considered SCR-type component. (Page 4, lines 20-23).

As described in the above portion of the specification, the Applicant appreciated that applying several halfwaves of suitable frequency can turn on a thyristor, even if each halfwave is individually insufficient to turn on the switch. This unexpected result is quite unlike Shinoda's technique of applying redundant pulses in case one pulse fails. In view of the foregoing, claim 25 patentably distinguishes over any combination of Shinoda and Nuckolls. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 44 and 45 depend from claim 25 and are therefore patentable for at least the same reasons.

Claim 27

Claim 27 recites, *inter alia*, that the SCR-type switch is turned on in response to an accumulated effect of a plurality of halfwaves of the high-frequency control voltage. As should be appreciated from the above discussion, Shinoda does not teach or suggest that an SCR-type switch is turned on in response to an accumulated effect of a plurality of halfwaves of the high-frequency control voltage. Bhagat fails to remedy this deficiency of Shinoda. Therefore, claim 27 patentably distinguishes over any combination of Shinoda and Bhagat. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 28-39 and 41-43 depend from claim 27 and are therefore patentable for at least the same reasons.

CONCLUSION

In view of the foregoing, the present application is believed to be in condition for allowance. A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

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Respectfully submitted,

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